POLYMERIZATION OF PHENANTHRENE INDUCED BY 1-METHYLNAPHTHALENE AT HIGH TEMPERATURES AND PRESSURES. Curtis L. Knudson, Bruce W. Farnum and Eugene A. Kline. Grand Forks Energy Technology Center, US DOE, Box 8213 University Station, Grand Forks, ND 58202.

A study of the effects of tetralin and synthesis gas ($CO-H_2$) on the polymerization of phenanthrene induced by thermally cracked 1-methylnaphthalene at 4000 psi between 440° and 500° C was carried out. Five sets of reactants were studied: (a) phenanthrene and N_2, (b) 1-methylnaphthalene and N_2, (c) phenanthrene, 1-methylnaphthalene and N_2, (d) tetralin, phenanthrene, 1-methylnaphthalene and N_2, and (e) phenanthrene, 1-methylnaphthalene and $CO-H_2$. The reactants were charged into a cold autoclave, heated to 450° C, and held one hour at each 10° temperature increment up to 500° C. Reactor gas and liquid phases were sampled during the reactions. Gas samples were analyzed by on-line GC, and liquid samples were analyzed by gel permeation HPLC, LVMS and GC-MS to determine composition changes. Results indicated that $CO-H_2$ or tetralin present in the reactor greatly reduced the polymerization of phenanthrene. Thermal cracking of 1-methylnaphthalene resulted in alkylation of phenanthrene in preference to 1-methylnaphthalene. Formation of biphenanthryl in preference to 1,2-dinaphthylethane or binaphthyl occurred in the mixed reactions. Synthesis of the various dimers was carried out to provide pure reference standards.